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(54) PORTABLE AGGREGATE FOR THE GENEERATION OF CURRENT, IN PARTICULAR A WELDING UNIT

(57) A portable aggregate for the generation of current, in particular a welding unit, in which an internal combustion engine (2), a three-phase alternator (4) driven by said internal combustion engine, which feeds connecting terminals or such a thing (14) for a DC consumer with a constant voltage by means of integrated electric rectifiers (26), and an automatic controller (15) are arranged on a common supporting frame (1); said automatic controller operates a servomotor (23) for the load-controlled controlling of the internal combustion engine (2) is supposed to be used with a structure as simple as possible both as a welding unit as well as an emergency power generator. For this purpose the alternator (4) which is designed according to the kind of a three-phase alternator is regulated in addition by the automatic controller (15) by means of the exciting circuit (21). A further transducer/electric rectifier switch (16) for the supply of further constant voltage connections, in particular a plug (9) with a further constant voltage, is present at the generated three-phase alternating current, and an inverter (17) and/or a transformer for the supply of a further socket outlet (10) or such with alternating current is present at least at one of two constant voltages.

The invention relates to a portable aggregate for the generation of current, in particular a welding unit, in which an internal combustion engine, a three-phase alternator driven by said internal combustion engine, which feeds connecting terminals or such a thing for a DC consumer with a constant voltage by means of integrated electric rectifiers, and an automatic controller are arranged on a common supporting frame; said automatic controller operates a servomotor for the load-controlled controlling of the internal combustion engine.

Such an aggregate is well-known from the prior art DE-OS 2 807 342. With this well-known aggregate the regulation of the three-phase alternator is done exclusively via the number of revolutions of the internal combustion engine. The alternator serves only as a welding alternator and the number of revolutions is adjusted load-controlled. In order to make it possible to work during welding breaks not with the normal idling speed, but with a substantially decreased number of revolutions, but nevertheless to have the possibility to trigger the ramping up of the alternator by means of a short circuit created by the welding electrode during the charge, a control circuit is planned, with which an auxiliary battery supplies the automatic controller during the low speed and when starting, that is when the voltage produced by the alternator is still too low. When a sufficiently high output voltage of the alternator is reached, the control circuit switches from the output voltage of the alternator to a supply of the automatic controller and the controller circuit.

Welding units with an adjustable DC generator driven by the internal combustion engine exist as well. The terminal voltage of these generators can be adjusted and tuned via the number of revolutions or the excitation. Furthermore well-known are a set of emergency power generators, which are designed as alternators or three-phase alternators and which are operated for the generation of an alternating current or a three-phase alternating current with the normal frequency of for example 50 cps with a as constant as possible number of revolutions of the internal combustion engine.

It is the task of the invention to create an aggregate of the kind mentioned with a light-weight and simple structure, which can be used both as a welding unit and/or a battery charger for batteries as well as an emergency power generator for the supply of appliances and devices which can only be operated with a certain constant supply voltage or alternating supply voltage of a conventional supply frequency; thus making it possible to generate for the generation of the welding voltage at least one further constant voltage and preferably also an alternating voltage with a given frequency in addition to the three-phase alternating current, whose frequency is with the number of revolutions, when the engine is load-controlled regulated.

The given task is solved by the fact that the alternator which is designed according to the kind of a three-phase alternator is regulated in addition by the automatic controller by means of the exciting circuit, that a further transducer/electric rectifier switch for the supply of further constant voltage connections, in particular a plug with a further constant voltage, is present at the generated three-phase alternating current, and that an inverter and/or a transformer is present for the supply of a further socket outlet or such with alternating current at least at one of two constant voltages.

Alternators which are designed according to the kind of a three-phase alternator, which are for example built as a claw pole generator, have an extremely simple, durable structure as well as a favorable weight/performance ratio. Only the exciting current needs to be supplied by means of rotating parts with a current consumption in the stator. Since the three-phase alternator is regulated both by means of the servomotor in a well-known way by means of the number of revolutions of the internal combustion engine and also in addition by means of the exciting circuit, the dynamic characteristic of the aggregate can be adapted favorably to the respective case of load. A different kind of the voltage-current control is usually desired and/or necessary for welding procedures, but also for the rapid charging of batteries, and also different operating voltages occur than for the supply of conventional power supply units, e.g. machine tools, lamps etc.. The three-phase alternating current generated by the alternator does not exhibit the conventional frequency, but a higher frequency which is variable with the number of revolutions. Because of the fact that this three-phase alternating current is in one case rectified by means of the integrated electric rectifiers and is in the other case led by means of a transducer/electric rectifier switch, it is possible to derive two different constant distribution voltages from the same alternator and besides this to generate an alternating current from the resulting constant voltage by means of the inverter or transformer, in which the frequency can be determined independently from the number of revolutions by means of a pulse generator or other control equipments and can be adapted to the usual frequency. The dynamic characteristic of the aggregate is adapted depending upon the kind of the connected consumers. During welding the current control is predominantly carried out by means of the engine speed, however, when auxiliary aggregates are connected to the other alternating voltage and/or constant voltage, the regulation is carried out in terms of a maintenance of the distribution voltage. Accordingly the output for the welding current supply is usually allowed to have a higher rated load than the two other outputs. A commercial two-stroke internal combustion engine is preferably used as internal combustion engine because of its simple structure and its favorable performance weight.

According to an embodiment the connecting terminals and the plugs are attached to a housing, which contains the automatic controller, the transducer/electric rectifier arrangement and the inverter, since they are protected and easily attainable in this location.

A pulse generator, which is used to maintain and/or determine the working frequency of the inverter for the alternating current dispensed at the socket outlet, can be designed as a separate component. If a clocked microprocessor is used in the automatic controller, then it is possible to discharge the control frequency of the inverter from there as well.

Because of the simple and dependable structure it is advisable to use a voltage transformer according to Villard as transducer/electric rectifier switch. With such a voltage transformer it is possible to multiply the available phase voltage of the three-phase alternating current with simple means.

Further details and advantages of the subject of the invention can be taken from the following description of the drawings.

The subject of the invention is illustrated as an example in the drawings. Shown are in

Fig. 1 an aggregate according to the invention schematized in a side view,
Fig. 2 a top view onto the aggregate according to Fig. 1 and
Fig. 3 a block diagram.

According to Fig. 1 and 2 a supporting frame (1) which is made of bent tubes is intended, in which an internal combustion engine (2) with an attached tank (3), designed as a two-stroke engine, and three-phase alternator (4) are arranged next to each other. The internal combustion engine (2) drives by means of a pulley (5) and a V-belt (6), which is preferably designed as a toothed drive belt, the drive pulley (7) of the alternator (4). A box shaped housing (8) is attached above the generator (4), with is equipped with connection plugs (9, 10) provided with covers and which contains an automatic controller arrangement. In addition, an indicator light (11), a circuit breaker (12) and a voltmeter (13) are attached at the top of the housing (8).

According to Fig. 3, connecting terminals (14) are also present at the housing (8) for the discharging of welding current. The housing (8) contains an automatic controller (15), a voltage transformer according to Villard (16), a thyristor bridge inverter (17), a pulse generator (18) for the inverter and a dry cell battery (19).

The automatic controller (15) receives a signal corresponding to the momentary operating voltage from the voltage transformer (16) and if necessary from the terminals (14) and regulates accordingly by means of a control line (20) the exciting circuit (21) of the three-phase alternator (4) and by means of a further control line (22) a servomotor (23), which regulates by means of a system of rods or such (24) the engine (2), for example the carburetor flap. The three-phase alternating current produced in the stator windings (25) of the three-phase alternator (4) is supplied on the one hand to an electric rectifier arrangement (26), built into the housing of the machine (4), which feeds the connecting terminals (14), and on the other hand to the voltage transformer (16), so that for example a maximum supply voltage of 75 V is present at the terminals (14) and a constant voltage of 220 V is present at the plug (9). The thyristor bridge inverter (17), which is supplied with constant current by the voltage transformer (16), is clocked by the pulse generator (18) and has an alternating voltage of for example 220 V with 50 cps at the socket outlet (10).

The circuit breaker (12) connects the battery (19) in the on-position with the constant voltage present at the terminals (14), so that the battery (19) can be rapidly charged. An indicator light (11) can be intended, which glows in a certain color, for example red, when the equipment is switched on and indicates thus that the equipment is ready for use, and which glows in a different color, for example green, when the nominal terminal voltage is reached and indicates thus that the desired nominal voltage is reached. In this embodiment the second lamp could replace the voltmeter (13). It is also possible to plan an additional manual control and regulate for instance with this manual control the desired voltage at the terminals (14) according to the voltmeter (13).

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PATENT CLAIMS

1. Portable aggregate for the generation of current, in particular a welding unit, in which an internal combustion engine, an alternator driven by said internal combustion engine, which feeds connecting terminals or such a thing for a DC consumer with a constant voltage by means of integrated electric rectifiers, and a controller are arranged on a common supporting frame; said controller operates a servomotor for the load-controlled controlling of the internal combustion engine, **characterized by the fact** that the alternator (4) which is designed according to the kind of a three-phase alternator is regulated in addition by the automatic controller (15) by means of the exciting circuit (21), that a further transducer/electric rectifier switch (16) for the supply of further constant voltage connections, in particular a plug (9) with a further constant voltage, is present at the generated three-phase alternating current, and that an inverter (17) and/or transformer is present for the supply of a further socket outlet (10) or such with alternating current at least at one of two constant voltages.

2. Aggregate according to claim 1, **characterized by the fact** that the connecting terminals (14) and the plugs (9, 10) are attached to a housing (8), which contains the automatic controller (15), the transducer/electric rectifier arrangement (16) and the inverter (17).

3. Aggregate according to claim 1 or 2, **characterized by the fact** that a pulse generator (18) is intended for the determination of the working frequency of the inverter (17).

4. Aggregate according to one of the claims 1 to 3, **characterized by the fact** that the transducer/electric rectifier switch (16) is a voltage transformer according to Villard.

For this 2 pages drawings